FORESTRY BMPs
IN SOUTH CAROLINA
Compliance and Implementation Monitoring Report, 2019-2020

South Carolina
Forestry Commission

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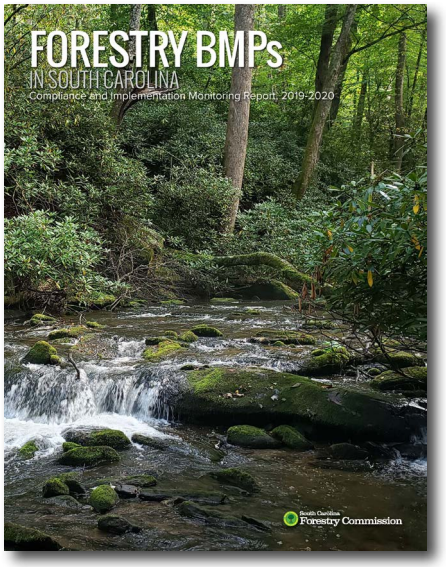

Compliance and Implementation Monitoring of Forestry Best Management Practices in South Carolina 2019-2020

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Photo by Patrick Hiesl, Clemson University

EXECUTIVE SUMMARY

This is the eleventh study conducted by the South Carolina Forestry Commission to determine compliance with South Carolina's Best Management Practices for Forestry (BMPs) during silvicultural activities. Recent forestry operations were evaluated on 179 randomly located sites during 2019-2020.

Overall BMP compliance on harvesting operations was 96.1%. Compliance indicates that proper use of applicable BMPs was sufficient to protect water quality on those sites. The overall implementation rate of individual BMP practices was 96.0%, compared to the regional average of 93.6% among southeastern states (Southern Group of State Foresters, 2018).

This study highlights numerous strengths in BMP compliance:

- Improved landowner awareness of BMPs, and increasing use of written contracts that require BMP compliance;
- High overall compliance with BMPs to protect water quality during forestry operations;
- Significant increase in stream crossing compliance, which often has the highest potential for water quality impacts.

Opportunities for improvement include:

- Stabilizing exposed soil after road construction;
- Installing waterbars or broad-based dips to stabilize roads;
- Properly sizing and installing culverts;
- Keeping road and ditch runoff out of streams;
- Adequately stabilizing skid trails;
- Taking steps to prevent depositing mud on roads.

The results of this study will be used to target training programs, outreach and technical assistance to seek continuous improvement in BMP compliance and implementation in South Carolina, and further advance successful protection of water quality during forestry operations.

INTRODUCTION

The South Carolina Forestry Commission promotes compliance with South Carolina's Best Management Practices for Forestry (BMPs) through training programs, BMP Courtesy Exams, technical assistance and regular monitoring. The BMP program is funded in part by the US Environmental Protection Agency under a Section 319 nonpoint source pollution control grant through the South Carolina Department of Health and Environmental Control.

Additional support for BMP compliance is provided through forest industry including the Sustainable Forestry Initiative (SFI) Program and Timber Operations Professional (TOP) logger training program. Partners such as the South Carolina Forestry Association, the South Carolina Timber Producers Association, Clemson University and the US Forest Service contribute to a successful program. Relationships with regulatory agencies including the SC Department of Health and Environmental Control, the US Army Corps of Engineers and the Environmental Protection Agency also strengthen BMP compliance.

STUDY METHODS

During 2019 and 2020, 179 forestry activities performed in 2019 were evaluated for compliance and implementation of BMPs. A regional protocol for a consistent, credible and statistically valid reporting process is presented in Silviculture Best Management Practices Implementation Monitoring – A Framework for State Forestry Agencies, (SGSF, 2007). This survey meets or exceeds all standards of the regional protocol.

Sample Size

Sample size was determined using the "Statistical Guide for BMP Implementation Monitoring," (SGSF Water Resources Committee, 2006). With an estimated implementation rate of 90%, a sample size of 144 sites would be needed to achieve the desired 5% margin of error within the 95% confidence interval. In this survey a larger sample size was taken to more accurately estimate implementation on a finer scale, by physiographic region, landowner category etc. Based on the sample size and results, the actual margin of error for statewide implementation rate was 2.93%.

Site Selection

To minimize bias, sites were selected using the SouthFACT program which detects changes in forest cover using satellite images. First, a target number of survey sites were identified for each county in proportion to the annual timber harvest reported in the 2017 US Forest Service Timber Product Output data. Silvicultural activities selected were at least 10 acres in size and conducted within the previous eight months. No association with streams or wetland areas was required to be included as a monitoring site. Within each county, a random number generator was used to select half of the identified sites included in the study. The survey included 155 clearcuts and 24 thinning/partial harvest operations.

Landowner Questionnaire

Once a site was selected for inclusion in the monitoring study, the local BMP Forester contacted the landowner to obtain permission to visit the site. Prior to the site inspection, each landowner was questioned about their level of familiarity with Forestry BMPs, use of a professional forester and use of a written contract. Four categories of landowners were identified for the purpose of this study:

1. Non-industrial private forest (NIPF) landowners who own less than 1,000 acres of forest land;
2. NIPF landowners who own more than 1,000 acres of forest land;
3. Public lands, owned or managed by local, state, or federal government;
4. Industrial lands, owned by forest products companies and timberland investment groups (TIMOs and REITs).

Site Evaluation

Site inspections were performed by three specially trained BMP Foresters. On each harvesting site up to 134 applicable BMPs were evaluated for successful implementation.

Each individual BMP practice was rated as Yes, No, Significant Risk, or Not Applicable.

- Yes – the individual practice was applicable and properly applied;
- No – the individual practice was applicable, but not applied or not applied correctly;
- Significant Risk – the individual practice was applicable, and failure to properly apply the practice will likely result in an adverse change in the chemical, physical or biological condition of the waterbody;
- Not Applicable – the individual practice was not applicable on that site.

Based on these individual practices, five categories of BMPs were rated for compliance. Each category was rated based on whether compliance was sufficient to protect water quality, and provides an assessment of whether water quality impacts occurred on the site. BMP categories are:

1. Streamside Management Zones
2. Stream Crossings
3. Road Systems
4. Harvesting Systems (Water Quality and Site Productivity)
5. Biomass Harvesting (Water Quality and Site Productivity)

Overall BMP compliance for each site was determined after all individual practices and BMP categories were fully evaluated. Each site was given an overall rating of Excellent, Adequate or Inadequate depending on the level of BMP compliance, as follows:

- Excellent Compliance – All recommended BMPs were implemented successfully, and no water quality impacts resulted from the operation. Significant additional steps were taken to stabilize the site, reduce potential impacts to water quality or site quality, or to mitigate aesthetic impacts.
- Adequate Compliance – Recommended BMPs were sufficiently implemented to prevent water quality impacts from the operation.
- Inadequate Compliance – Recommended BMPs were not implemented or were implemented without success. Likely water quality impacts were noted as a result of poor or improper BMP implementation.

Compliance and Implementation

Determination of Excellent, Adequate, or Inadequate compliance with BMPs was closely correlated with the likelihood or presence of water quality impacts, and was consistent with applicable state and federal water quality laws and regulations.

This study also includes implementation rates that refer to the percentage of applicable individual practices that were properly applied on the site. Therefore, the implementation rate indicates the level at which BMPs were properly applied, and the compliance rate indicates whether the applied practices successfully protected water quality.

Quality Assurance Checks

The Environmental Program Manager performed quality checks on evaluated sites to ensure consistency. Checks were completed while monitoring was ongoing so any corrections could be immediately applied. Compliance ratings for BMP categories were highly consistent.

MONITORING RESULTS FOR HARVESTING

Streamside Management Zones - 99.1% Compliance

Perennial or intermittent streams were present on 65% of the sites included in this monitoring survey. The standard SC BMP recommendation for forested SMZ width on perennial streams is 40 feet. Perennial streams in the survey were found to have an average SMZ width of 50 feet and median width of 45 feet. A forested overstory buffer is not required on intermittent streams. However, intermittent streams had a forested buffer averaging 30.5 feet wide. No trout waters or braided stream systems were identified in this survey.

Compliance with BMPs for Streamside Management Zones was sufficient to protect water quality on 99.1% of sites. One site was rated as having inadequate compliance in this category.

A total of 1,123 applicable BMPs were evaluated with 98.5% implementation. Seventeen individual practices were not properly applied. The most common deficiency was not keeping the stream free of debris.


Adequate SMZ


Inadequate SMZ

Stream Crossings - 88.9% Compliance

Thirty seven haul road stream crossings were evaluated on 27 different sites. Thirty crossings were culverts, three were fords, and four were bridge installations. Only five of the crossings evaluated were new installations; the remaining 32 were existing. Compliance with BMPs for Stream Crossings was sufficient to protect water quality on 88.9% of sites. Three sites were rated with inadequate compliance in this category, with one site posing Significant Risk to water quality.

A total of 173 applicable BMPs were evaluated with 93.1% implementation. Twelve individual practices were not properly applied, two of those with Significant Risk. Major issues were failure to stabilize disturbed soil at crossings after construction, failure to keep road and ditch runoff out of streams at crossings, and improper sizing and installation of culverts.

Stabilized culvert

Unstabilized culvert

Road Systems - 96.7% Compliance

Road systems were evaluated on 151 sites, with existing roads being used on all but 10 sites, which had new road construction. One silvicultural wetland road was evaluated and was in compliance with BMPs. Compliance with BMPs for road systems was sufficient to protect water quality on 96.7% of sites. Five sites were rated with inadequate compliance in this category, with one rated Significant Risk.

A total of 987 applicable BMPs were evaluated with 95.2% implementation. Forty-seven individual practices were not properly applied, five of those with Significant Risk. Primary concerns were failure to stabilize roads with waterbars or broad-based dips after the operation. This only occurred on 46% of the sites where it was needed, and only 68% of sites were compliant in stabilizing exposed soil after construction. Culvert inlet and outlet stabilization and culvert maintenance also posed problems along with failure to avoid traffic on soft roads.

Harvesting Systems - 99.4% Compliance

BMPs for Harvesting are separated into two sections, practices related to water quality and those related to non-water quality on-site impacts. Harvesting was evaluated on all sites, and compliance with BMPs was sufficient to protect water quality on 98.9% of those. Compliance with BMPs was sufficient to prevent non-water quality on-site impacts on 100% of sites. The average compliance rating for harvesting systems related to both water quality and on-site impacts was 99.4%.

A total of 2,364 applicable harvesting BMPs were evaluated with 95.9% implementation. Ninety-seven individual practices were not properly applied, with two posing Significant Risk.

Major deficiencies related to water quality were failure to control erosion on skid trails with waterbars, debris or seed (57% of tracts in compliance) and a failure to use adequate crossings on ephemeral, intermittent and/or perennial

Inadequate road entrance

streams (88% of sites in compliance). The primary concern related to non-water quality impacts was failure to prevent depositing mud on roads; this only occurred 51% of the time when necessary. A minor issue was failure to stabilize skid trails with mats or debris to prevent excessive rutting; five sites were out of compliance in this category.

Biomass Harvesting - 100% Compliance

For the second time, BMP compliance and implementation on biomass harvests were surveyed. Forest biomass harvesting recommendations for South Carolina were published in 2012 in response to an increased interest in biomass production at the time. For purposes of this survey, biomass is defined as above-ground woody material removed from forests for energy production.

Woody biomass is often a by-product of forest management, restoration and fuel reduction treatments. Biomass harvesting may range from simple collection of accumulated logging debris to intensive removal of woody material specifically grown for biomass energy production. Biomass harvesting may be conducted at the same time as conventional logging, as an intermediate treatment or as a stand-alone practice. Woody biomass is chipped on-site before it is hauled to the mill and differs from "clean chips" which are used in fiber production.

BMPs for Biomass are separated into two sections, practices related to water quality and those related to site productivity. Biomass harvesting occurred on six of the 179 sites surveyed (3.4%). While this indicates the infrequent occurrence of biomass harvests, this sample size does not yield statistical significance to determine true compliance and implementation rates for biomass harvests.

Fifty-seven applicable biomass BMPs were evaluated with 84.2% implementation. Fourteen individual practice were not applied properly. The main issues were that biomass harvests were not planned to maintain a variety of habitat and age classes across the property, snags were not retained, and alternate methods of stabilization were not used when debris was not sufficient. There were no water quality impacts as a result of the biomass harvest on any of the sites evaluated.

Overall Harvesting Compliance - 96.1% Compliance

Overall BMP compliance on harvested sites was sufficient to protect water quality on 96.1% of sites. A total of seven sites were found to have inadequate BMP compliance, posing potential water quality impacts.

On harvested sites, 4,785 individual practices were evaluated. Of that number, 4,594 practices were properly applied, and 182 practices were not, nine of those with Significant Risk. Total implementation rate for all practices was 96.0%.

LANDOWNER AND SITE INFORMATION

Prior to site visits, contact was made with each landowner, or landowner agent, to request permission and ask questions about the activity on their property. Additional data was collected to look for relationships between BMP compliance and site factors such as physiographic region and soil texture.

All but one landowner reported using a written contract for their forest operation, which is similar to the 2016 results. In addition, 79% of nonindustrial private landowners with fewer than 1,000 acres reported familiarity with BMPs. This is an increase from 65% in 2016 and only 45% in 2012. This indicates that landowner awareness and understanding of BMPs continues to grow, and that landowners and forestry professionals are increasingly likely to include BMP compliance in written contracts (only one site didn't include BMPs in the written contract).

The average harvest size was 65.15 acres, a slight increase from 63.05 acres in 2016. Timber harvesting activities were evaluated on a total of 11,661 acres during this survey. Six of the seven sites that were rated with Inadequate compliance overall occurred in the Southern Piedmont

physiographic region with an upland clay terrain type and a clay or loam dominant soil texture. The other site that rated inadequate occurred in the Blue Ridge physiographic region with an upland clay terrain type and loam as the dominant soil texture. This trend mimics those in previous monitoring studies; the Piedmont and Blue Ridge regions have more risk because of topography, soils and more frequent water features relative to the other regions of the state.

COMPLIANCE TRENDS

Harvesting Compliance Trends

Overall compliance with BMPs during harvesting operations was 96.1% (Table 1). This represents a slight decrease from 97.0% in 2016. The overall ratings indicate that landowners, loggers and forestry professionals continue to be committed to protecting water quality with proper application of Best Management Practices.

The overall implementation rate for BMPs during harvesting operations was 96.0%, compared to the Southern regional average of 93.6% (Implementation of Forestry Best Management Practices: 2018 Southern Region Report, May 2019, SGSF Water Resources Committee). Most states in the south report BMP implementation rather than compliance, so this number can be compared with regional results for 11 Southern states. Implementation of BMPs in South Carolina is consistent with the region.

Every category except Stream Crossings had compliance above 96% (Table 2). Stream Crossings has historically been the category with the lowest compliance, and it continues to be the area with the greatest opportunity for improvement. This category is critical for water quality protection since it often involves use of heavy equipment and soil disturbance near water bodies. The increase

Table 1. Overall harvesting compliance by year

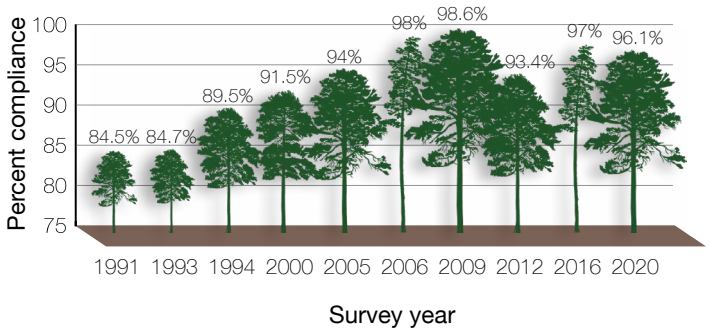


Table 2. Harvesting BMP compliance trends by category

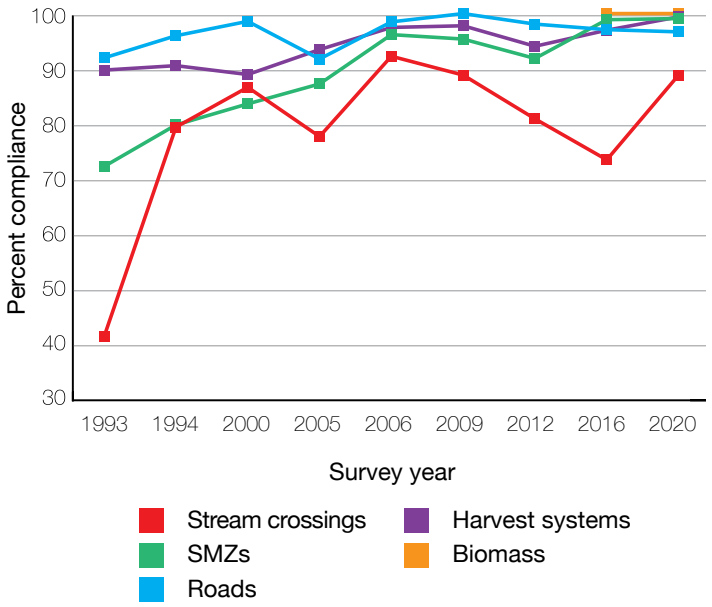
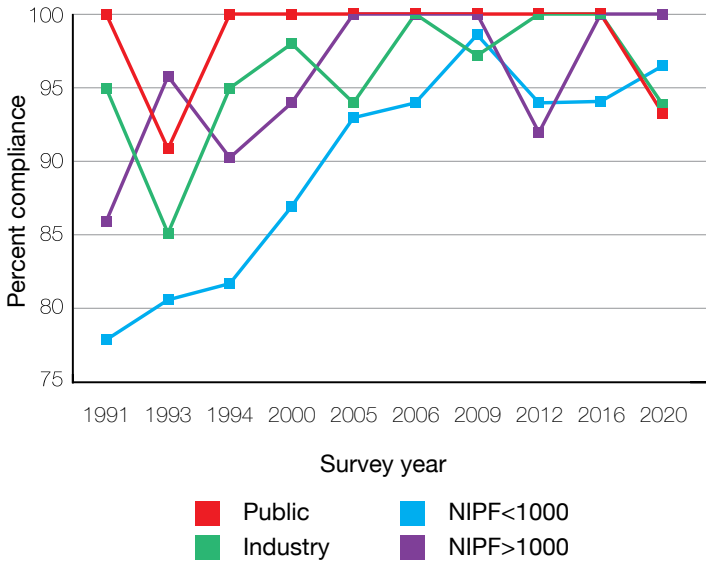


Table 3. Harvesting BMP compliance trends by ownership



in compliance found in this study is encouraging and hopefully marks a turning point in the downward trend exhibited over the last 15 years.

All four ownership groups demonstrated high levels of BMP compliance (Table 3). For the first time in BMP compliance monitoring in South Carolina, lands owned by NIPF<1000 acres ranked higher than public and industrial ownership, and NIPF>1000 was the only category with 100% compliance. The sample size for public lands was quite small, only 15 sites; 49 sites were in industrial ownership, 85 were owned by NIPF<1000, and 30 were owned by NIPF>1000.

CONCLUSION

The results of this study demonstrate the continued commitment to compliance and implementation of South Carolina's Best Management Practices for Forestry by landowners, loggers and forestry professionals.

This study highlights numerous strengths in BMP compliance:

- Improved landowner awareness of BMPs;
- High overall compliance with BMPs to protect water quality during forestry operations;
- Excellent compliance with Streamside Management Zones, which often have a high potential for water quality impacts;
- Streamside Management Zones are frequently wider than the minimum recommendations on perennial and intermittent streams.

The results of this study will also be used to target training programs, outreach and technical assistance to continually improve compliance. This study highlights the following points:

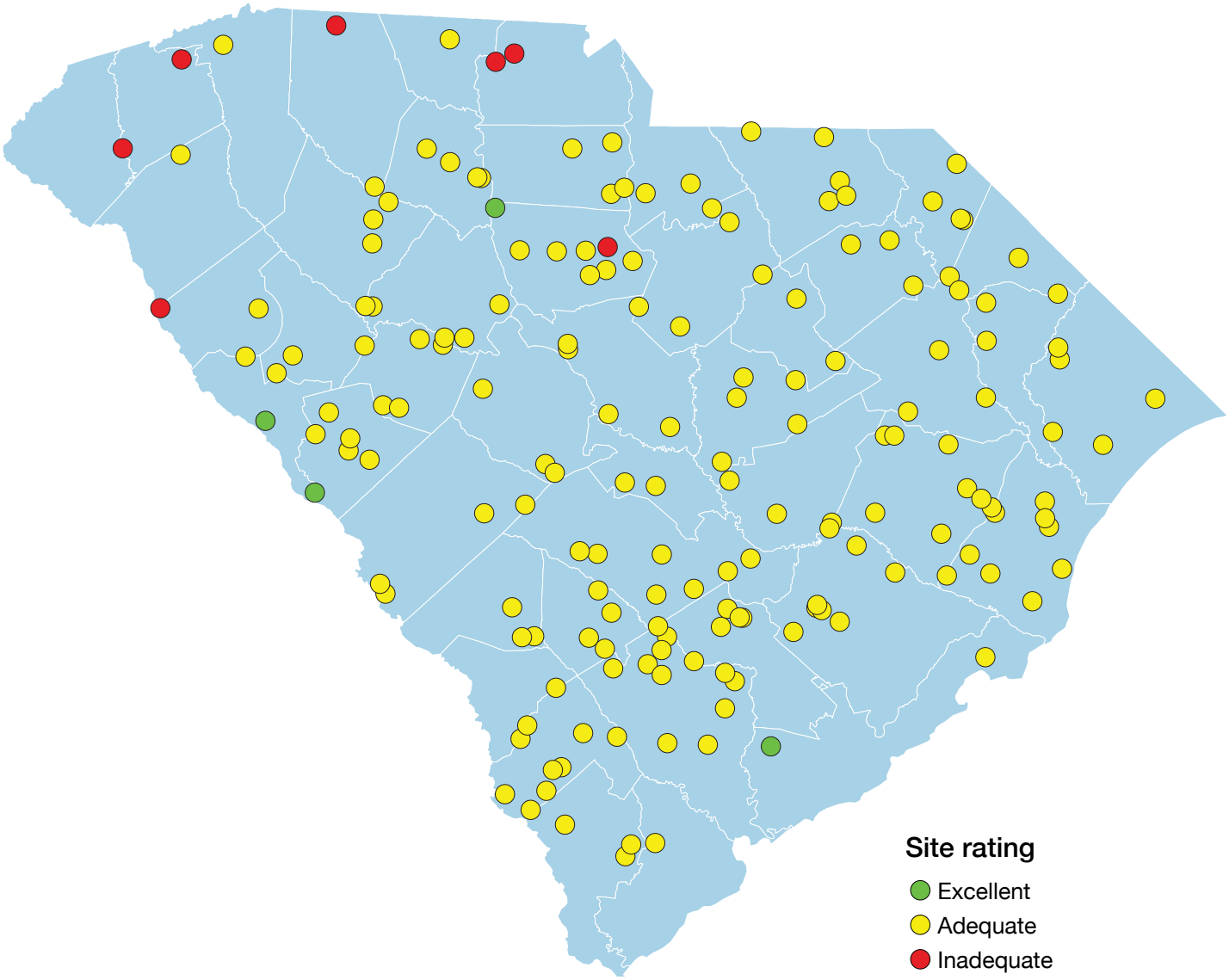
- Stream crossings continue to present opportunities for improving compliance;
- Some BMPs are not frequently encountered in randomly selected sites. Wetland roads, trout streams, braided stream systems and biomass harvests may require further review;
- The most important individual practices for improvement are:
  - Stabilizing disturbed soil at stream crossings;
  - Avoiding altering the flow of ephemeral features;
  - Properly sizing and installing culverts;
  - Minimizing the number of stream crossings;
  - Stabilizing roads with waterbars or broad-based dips;
  - Keeping road and ditch runoff out of streams;
  - Controlling erosion on skid trails with waterbars, debris or seed and straw;
  - Protecting intermittent and ephemeral streams during skidding;
  - Installing adequate stream crossings;
  - Taking steps to prevent depositing mud on roads.

The results of this study will be used to seek continual improvement in BMP compliance and implementation in South Carolina, and further advance successful protection of water quality during forestry operations.

Photo by Patrick Hiesl, Clemson University

APPENDIX
AND DATA FORMS

Location of BMP sites



Follow-up BMP Compliance Monitoring Form

Site ID Number: _____

LANDOWNER QUESTIONNAIRE

Landowner Name _____
Landowner Address _____
Landowner City, State _____
Landowner ZIP _____
Landowner Phone _____

Ownership Class
NIPF<1000 ☐ Industry ☐
NIPF>1000 ☐ Public ☐

	Y	N	NA
Are you familiar with SC BMPs for Forestry?	☐	☐	☐
Did you rely on a forester during harvest?	☐	☐	☐
Was there a written contract for the harvest?	☐	☐	☐
Was BMP compliance required in the contract?	☐	☐	☐
Will you allow SCFC to include your property in the monitoring project?	☐	☐	☐
Did landowner request a copy of the completed form?	☐	☐	☐
Do you wish to receive information from the SCFC about cost-share for site prep and reforestation?	☐	☐	☐

SITE

Acres harvested _____
Date Logged _____
County _____
Region _____
Date of field evaluation _____
Evaluator _____

Original SIte ID _____
Latitude _____
Longitude _____
Courtesy Exam Site ID _____

Physiographic Region
Blue Ridge ☐
Southern Piedmont ☐
Carolina Sandhills ☐
Southern Coastal ☐
Atlantic Coastal ☐

Terrain Type
Upland Clay ☐
Sandhills ☐
Flatwoods ☐
Bottomland ☐
Carolina Bay ☐

Dominant soil texture: Sand ☐ Clay ☐ Loam ☐

	Y	N	NA
Is the site predominantly wetland?	☐	☐	☐

STREAMSIDE MANAGEMENT ZONES

Stream Types Present: Perennial ☐ Intermittent ☐ Ephemeral ☐ None ☐

Average slope adjacent to perennial and intermittent streams: < 5% ☐ 5-20% ☐ 21-40% ☐ > 40% ☐

Recommended width of primary SMZ _____
Recommended width of secondary SMZ _____
Average width of SMZ on perennial streams _____
Average width of SMZ on intermittent streams _____
(estimate to nearest 5 feet if buffer <50ft; nearest 10 ft if >50)
Length of all streams (miles to nearest 1/10th) _____

	Y	N	SR	NA
On perennial streams was 50 BA retained evenly spaced?	☐	☐	☐	☐
On perennial streams with less than 50 BA were all trees retained?	☐	☐	☐	☐
Forest floor and banks protected on intermittent streams	☐	☐	☐	☐
Were trees directionally felled away from the stream?	☐	☐	☐	☐
Was harvesting in SMZ done sufficient to minimize disturbance?	☐	☐	☐	☐
Was debris kept out of stream channel?	☐	☐	☐	☐
Toxic and hazardous materials kept out of SMZ	☐	☐	☐	☐
Decks located outside of SMZ	☐	☐	☐	☐
Road construction kept out of SMZ	☐	☐	☐	☐
Excessive rutting avoided within SMZ	☐	☐	☐	☐
Fifteen percent or less soil exposed within SMZ	☐	☐	☐	☐
Decks located outside ephemeral areas	☐	☐	☐	☐
Skidding within ephemeral area avoided except at crossings	☐	☐	☐	☐

	Y	N	SR	NA
Altering flow in ephemeral areas was avoided	☐	☐	☐	☐
Road construction avoided in ephemeral areas except crossings	☐	☐	☐	☐
Avoided emptying road runoff into ephemeral areas	☐	☐	☐	☐
Trout Waters				
Trout waters present	☐	☐		
Wider primary SMZ retained (80' on slopes over 5%)	☐	☐	☐	☐
Drainage structures do not divert water into streams	☐	☐	☐	☐
Exposed soils within SMZ revegetated	☐	☐	☐	☐
Mulch, gravel, rock used to stabilize roads at crossings	☐	☐	☐	☐
Overall SMZs sufficiently protected water quality	☐	☐	☐	☐

ROADS

Road Types Present: Main access ☐ Limited use ☐ None ☐
Existing roads used ☐ New roads constructed ☐

Planning	Y	N	SR	NA
Were sensitive sites avoided or identified when possible?	☐	☐	☐	☐
Road designed to meet long range objectives	☐	☐	☐	☐
Roads located on ridge sides to ensure drainage	☐	☐	☐	☐
Roads follow contour with grades between 0 and 10 percent	☐	☐	☐	☐
Roads outsloped in hilly terrain	☐	☐	☐	☐
Travel width complies with BMPs (12-14' LU; 16-20' MA)	☐	☐	☐	☐
Right of way daylighted where needed	☐	☐	☐	☐
Lowland roads less than 2 feet above normal grade	☐	☐	☐	☐
Construction				
Culverts remove runoff from inside ditches on steep grades	☐	☐	☐	☐
Culverts and structures large and frequent enough for water volume	☐	☐	☐	☐
Adequate compacted fill on culverts	☐	☐	☐	☐
Drainage structures empty into undisturbed forest floor	☐	☐	☐	☐
Avoided construction of wider or longer roads than necessary	☐	☐	☐	☐
Stabilization				
Culvert inlets/outlets stabilized where needed	☐	☐	☐	☐
Exposed mineral soil stabilized after road construction where needed	☐	☐	☐	☐
Waterbars used to retire LU and MA roads	☐	☐	☐	☐
Maintenance				
Culverts maintained to prevent blockage	☐	☐	☐	☐
Road grading minimal in hilly terrain	☐	☐	☐	☐
Traffic on soft roads prevented	☐	☐	☐	☐
Avoided roads on ridges with poor drainage	☐	☐	☐	☐
Avoided emptying road runoff directly into drains	☐	☐	☐	☐
Wetland Road Construction				
Are wetland roads present?				
Roads in waters of US kept to minimum number/length/width/height	☐	☐	☐	☐
Road fill minimizes discharges in US waters	☐	☐	☐	☐
Road fill prevents restriction of expected floods	☐	☐	☐	☐
Road fill properly stabilized to prevent erosion	☐	☐	☐	☐
Road construction minimized encroachment outside fill boundaries	☐	☐	☐	☐
Vegetative disturbance in US waters minimized	☐	☐	☐	☐
Movement and migration of aquatic life maintained	☐	☐	☐	☐
Borrow taken from upland where feasible	☐	☐	☐	☐
Threatened and Endangered species not affected by discharge	☐	☐	☐	☐
Discharges avoided if alternatives exist	☐	☐	☐	☐
Discharges located away from public water intakes	☐	☐	☐	☐
Discharges avoided in shellfish production areas	☐	☐	☐	☐
Discharges avoided near wild and scenic rivers	☐	☐	☐	☐
Suitable clean fill material used free of toxics	☐	☐	☐	☐
Temporary fills removed and area restored	☐	☐	☐	☐
Road height for LU and MA roads under 2 feet	☐	☐	☐	☐
Fill height at crossings lower than approaches	☐	☐	☐	☐
Fords have adequate rock bases	☐	☐	☐	☐

	Y	N	SR	NA
Bridges/culverts/fords allow for expected flows	☐	☐	☐	☐
Soil stabilized at crossings of major runs	☐	☐	☐	☐
Temporary crossings designed well and removed after operation	☐	☐	☐	☐
Where necessary logs used as road base	☐	☐	☐	☐
Dredge ditch constructed on upper side of road with cross drainage	☐	☐	☐	☐
Ditches do not carry water more than 1/4 mile	☐	☐	☐	☐
Roadside ditches designed to avoid wetland drainage	☐	☐	☐	☐
Overall road system sufficiently protected water quality	☐	☐	☐	☐

STREAM CROSSINGS

	Y	N
Perennial or intermittent stream road crossings present	☐	☐

Type and number of crossings: Bridge ___ Culvert ___ Ford ___ Debris ___ Other ___

	Y	N	SR	NA
Stream crossings avoided where possible	☐	☐	☐	☐
Streams crossed at right angles where possible	☐	☐	☐	☐
Approaches to crossings kept gentle	☐	☐	☐	☐
Drainage structures used to prevent road and ditch runoff into streams	☐	☐	☐	☐
Culverts sized and installed following BMPs	☐	☐	☐	☐
Disturbed soil at crossings stabilized soon after construction	☐	☐	☐	☐
Soil fill avoided except with culverts	☐	☐	☐	☐
Avoided altering flow of stream	☐	☐	☐	☐
Was ditch runoff kept out of stream at crossing?	☐	☐	☐	☐
Woody fill and temporary culverts removed	☐	☐	☐	☐
Overall, road stream crossings sufficiently protect water quality	☐	☐	☐	☐

TIMBER HARVESTING

Harvest type: Clearcut ☐ Thin/partial harvest ☐ Salvage ☐ Other ☐

Planning	Y	N	SR	NA
Harvest planned to minimize number of stream crossings	☐	☐	☐	☐
Crossings located where stream impacts would be minimal	☐	☐	☐	☐
Decks located on the most stable soils	☐	☐	☐	☐
Decks with fill kept to minimum size	☐	☐	☐	☐
Sensitive areas were identified	☐	☐	☐	☐
Execution				
Were SMZs established adjacent to perennial or intermittent streams and lakes?	☐	☐	☐	☐
Was excessive rutting minimized in floodplains bottomlands, and erosive slopes?	☐	☐	☐	☐
Did harvesting cease when turbid overland flow went off-site?	☐	☐	☐	☐
Primary skid trails designed to skid logs uphill	☐	☐	☐	☐
Flow on skid trails controlled with drainage structures	☐	☐	☐	☐
Bladed skid trails meet LU road specs	☐	☐	☐	☐
Primary skid trails on erosive slopes retired with waterbars or seed	☐	☐	☐	☐
Was equipment serviced away from water bodies or wetlands?	☐	☐	☐	☐
Were skid trails kept out of SMZs and stream channels?	☐	☐	☐	☐
Skidding perpendicular to contour was minimized	☐	☐	☐	☐
Skid crossings on perennial or intermittent streams used adequate crossing	☐	☐	☐	☐
Skidding over intermittent or ephemeral channels was protected with debris	☐	☐	☐	☐
Culverted crossings left in place when needed in 10yrs	☐	☐	☐	☐
Was use of fill avoided in skid trail stream crossings w/ or w/o debris?	☐	☐	☐	☐
Follow-up				
Temporary crossings/blockages in sloughs were removed	☐	☐	☐	☐
Overall timber harvesting was sufficient to protect water quality	☐	☐	☐	☐
Site Productivity				
Surrounding land use wildlife habitat aesthetics planned for on larger clearcuts	☐	☐	☐	☐

	Y	N	SR	NA
Skid trails planned to occupy least amount of area	☐	☐	☐	☐
Site was logged when dry	☐	☐	☐	☐
Amount and depth of rutting acceptable	☐	☐	☐	☐
Low impact system used when logging wet sites	☐	☐	☐	☐
Skid trails stabilized with mats or debris to prevent excessive ruts	☐	☐	☐	☐
Steps taken to avoid depositing mud on roads	☐	☐	☐	☐
Conditions conducive to rapid regeneration	☐	☐	☐	☐
Fuel or oil spills cleaned immediately	☐	☐	☐	☐
Lubricants and trash disposed of properly	☐	☐	☐	☐
Overall timber harvesting sufficient to maintain site productivity	☐	☐	☐	☐

BIOMASS

	Y	N
Was a biomass harvest conducted on-site?	☐	☐

SMZs	Y	N	SR	NA
Temporary crossings/blockages in sloughs were removed	☐	☐	☐	☐
Overall timber harvesting was sufficient to protect water quality	☐	☐	☐	☐
Harvest				
Alternate methods used for stabilization where debris not sufficient?	☐	☐	☐	☐
Removal of stumps, roots, leaf litter, and forest floor for biomass avoided?	☐	☐	☐	☐
Biomass removal avoided on steep slopes (>30%) or erodible soils?	☐	☐	☐	☐
Biomass removal on slopes >20% limited to reduce erosion?	☐	☐	☐	☐
Productivity and Soil Nutrients				
Biomass harvest done in conjunction with normal logging when possible?	☐	☐	☐	☐
Existing roads, skid trails, and landings used where possible?	☐	☐	☐	☐
Biomass removal limited on sites with shallow soils, very sandy soils or low fertility	☐	☐	☐	☐
Piling of residual or fine material that would impede regeneration avoided?	☐	☐	☐	☐
Leaves, needles and branches retained to the degree possible?	☐	☐	☐	☐
Fertilizer, lime or ash added where nutrient depletion is a concern?	☐	☐	☐	☐
Dead Wood, Wildlife Habitat and Biological Diversity				
Biomass harvesting avoided in sensitive areas?	☐	☐	☐	☐
Biomass harvest used to enhance habitat for rare, threatened or endangered spp.?	☐	☐	☐	☐
Snags retained where available and safe?	☐	☐	☐	☐
Down woody debris left in variety of sizes?	☐	☐	☐	☐
Biomass harvest planned to maintain variety of habitat and age classes?	☐	☐	☐	☐
Overall biomass harvesting sufficient to protect water quality	☐	☐	☐	☐
Overall biomass harvesting sufficient to maintain site productivity	☐	☐	☐	☐

Overall Rating Excellent ☐ Adequate ☐ Inadequate ☐

COMMENTS

List major problems if Inadequate/Noteworthy positive and negative aspects for all

ADDITIONAL RESOURCES

South Carolina Forestry Commission. *www.state.sc.us/forest/refbmp.htm. South Carolina's Best Management Practices for Forestry.*

South Carolina Forestry Commission Environmental Management. *www.state.sc.us/forest/menvir.htm*

South Carolina Forestry Commission. 2012. *www.state.sc.us/forest/mbiomasssupp.pdf. South Carolina's Best Management Practices Forest Biomass Harvesting Recommendations: A Supplement to South Carolina's Best Management Practices for Forestry.*

Southern Group of State Foresters Water Resources Committee. 2007. *Silviculture Best Management Practices Implementation Monitoring A Framework for State Forestry Agencies* White Paper.

Southern Group of State Foresters Water Resources Committee. 2018. *Implementation of Forestry Best Management Practices: 2018 Southern Region Report*

"Project Overview." *www.southfact.com*. Southern Group of State Foresters, 2015. Web. 2 February 2017.

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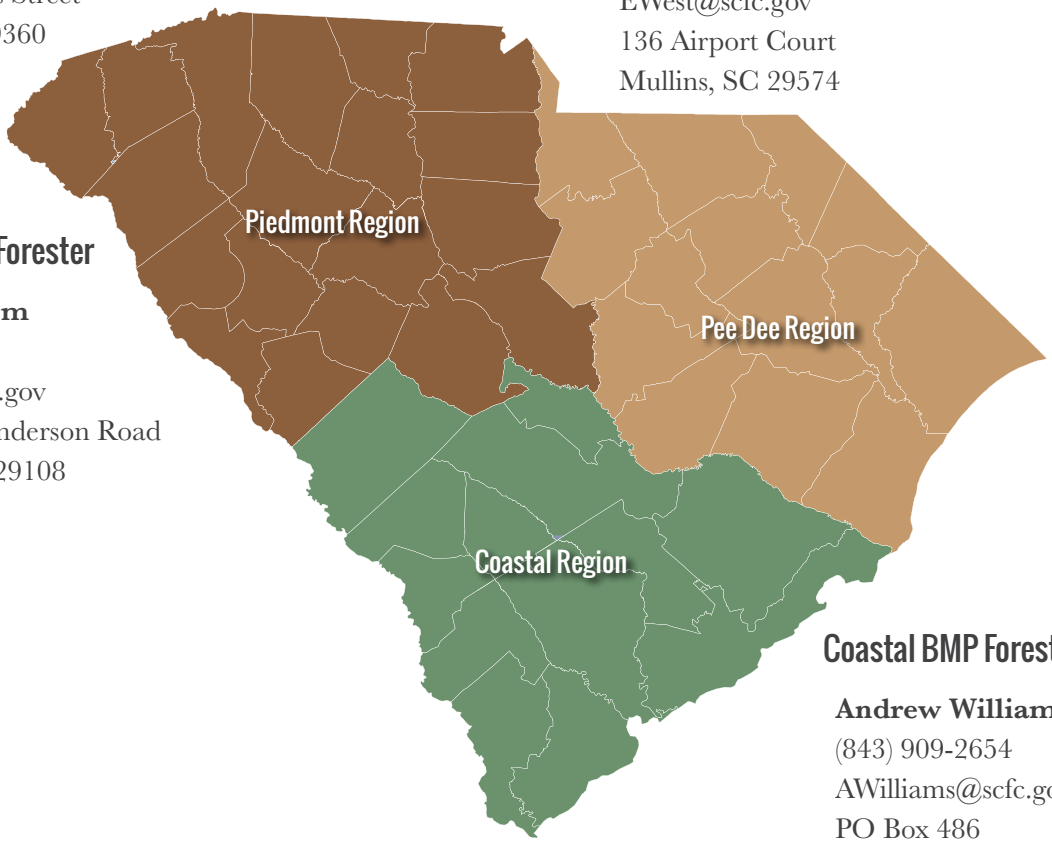

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